Inter-twining of tendrils.[1]—That the tendrils of certain Passifloræ respond to the contact of one another, and as a consequence form inter-twining coils, was shown in a previous article in this volume, p. 123. In an extension of this work, some attention has been paid to the tendrils of *Micrampelis echinata* (Muhl.) Raf. (Echinocystis lobata.) Chas. Darwin says in regard to this plant:[2] "One of my plants bore two shoots near together, and the tendrils were repeatedly drawn across one another, but it is a singular fact that they did not once catch one another. It would appear as if they had become habituated to contact of this kind, for the pressure thus caused must have been much greater than that caused by a loop of thread weighing only one sixteenth of a grain." He adds, "I have, however, seen several tendrils of Bryonia dioica interlocked, but they subsequently released one another."

The tenor of the paragraph is such that the reader is left to infer that these organs possess such development of the contact sense as to be able to distinguish the contact of tendrils from that of other bodies. This inference is re-asserted in more positive form in many important physiological text books, and the writer would hesitate to offer evidence to the contrary, were not the facts so easily and readily apparent.

It is of interest to know that the plants of Micrampelis echinata, upon which Darwin's observations were made, were raised from seeds sent him by Asa Gray, and the erratic behavior of the tendrils of this representative of an American genus may be due to a changed environment, and climatic conditions. Several plants of this species, growing in a natural situation on the university campus, have been under observation for some time, and all exhibit numerous instances of the inter-sensitiveness of the tendrils. If an active tendril is lightly touched on the sensitive portion of the ventral surface by any part of another tendril, it will form curves in thirty to seventy seconds, while on any one plant can be seen all stages of inter-reaction; tendrils can be found that have recently made contact and formed curves of perhaps forty degrees, others that have formed one or two coils around the grasped portion, and others that have completed the coils and thrown their own free portion into spirals after the manner of mature tendrils. If the tendrils have come in contact at the sensitive part of both, the reactions in each will be similar. The size and elastic firmness of the spirals show that they are functionally normal.

Less frequent examples of inter-twining have also been noticed in

[1] Read before the Botanical Club, A. A. A. S., Madison meeting.
[2] Climbing Plants, p. 131.

the tendrils of *Parthenocissus quinquefolia* (Linn.) Planch. (Ampelopsis quinquefolia Michx.)

From the results of investigation by Haberlandt, Pfeffer, Hofmeister, MacFarlane and others, on various plants showing "contact movements," it appears that none have developed the contact sense in such a manner as to be able to distinguish portions of its own or similar plant bodies from foreign objects, as would be implied in the results of Darwin's observations. Some of the workers named, however, have quoted this statement of Darwin's, but apparently without having confirmed it by actual experiment or observation.

In general it may be safely said that tendrils distinguish only the force of the impact, and roughness of the surface of a body coming in contact with them, and the assertion is hazarded that the inter-reaction of tendrils will be found present in all tendril plants having a habit of dense, vigorous growth.—D. T. MacDougal, *Botanical Laboratories, University of Minnesota.*

CURRENT LITERATURE.

The power of bacteria to penetrate vegetable tissue.

An admirable and much needed piece of work has been done by Dr. H. L. Russell,[1] now of the University of Wisconsin, in adding to and setting in order the scattered knowledge regarding the power possessed by bacteria to penetrate and induce pathological changes in healthy vegetable tissues. He finds from his own researches, what has already been held as highly probable by many vegetable pathologists, that "normally, the healthy plant with intact outer membranes is free from bacteria within its tissues." But this is not due apparently to any marked germicidal properties of plant juices, and in this respect there is a great difference between plants and animals. Many species of bacteria, including animal parasites, plant parasites upon other hosts than those in which they are parasitic, and saprophytes, more especially the last, are able to live for some time, when artificially inoculated, and even to spread through the tissues to a limited extent. In such cases no evident pathological changes are brought about, and the intruding germs eventually disappear.

The method by which germs effect their distribution, which is almost invariably from one cell cavity to another, and not intercellular,

[1] Russell, H. L.: Bacteria in their relation to vegetable tissue; a dissertation presented to the board of university studies of the Johns Hopkins University for the degree of doctor of philosophy. 41 pp. Roy. 8vo. Baltimore, 1892.